



Idaho State Department of Agriculture
Division of Agricultural Resources

Mill Slough
Water Quality Monitoring Report
April 2003 through August 2003

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ISDA Technical Report Summary W-9

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Introduction

The Idaho State Department of Agriculture (ISDA) recently completed a short term water quality monitoring program on Middleton Canal also named Mill Slough (Figure 1). The monitoring was conducted to assist a local agricultural producer (Rosti Farms) in determining the effects that sediment retention ponds would have on the water quality of Mill Slough. Monitoring was conducted during a portion of the irrigation season from April through August, 2003.

In 1999 ISDA conducted monitoring on Mill Slough prior to the slough entering the Boise River. Data showed that sediment loading from the slough was minimal and the bulk of the phosphorus load consisted of non particulate phosphorus (dissolved). The request from Rosti Farms consisted of monitoring at three locations along the slough to determine if any particular reach of the slough had higher sediment and phosphorus loads than the other. The two furthest upstream sites were located on

Rosti farm property in potential areas of sediment pond development. The third site was near the town of Middleton where ISDA had originally monitored in 1999 (Figure 1). All sampling locations were at cross roads and are as follows: MS-1 (N. Middleton Rd.), MS-2 (CanAda Rd.), and MS-3 (N. Pollard Rd.).

General Results

Total Suspended Solids (TSS)

Total suspended solid concentrations (TSS), throughout Mill Slough, were overall quite low and did not contribute a significant load of TSS to the Boise River. The TSS target established for the Lower Boise River states "no greater than 50 mg/L monthly average, not to exceed 80 mg/L for greater than 14 days."

There was only one exceedance of this target and it occurred in May at the furthest upstream station (MS-3). The two samples in May that were collected 14 days

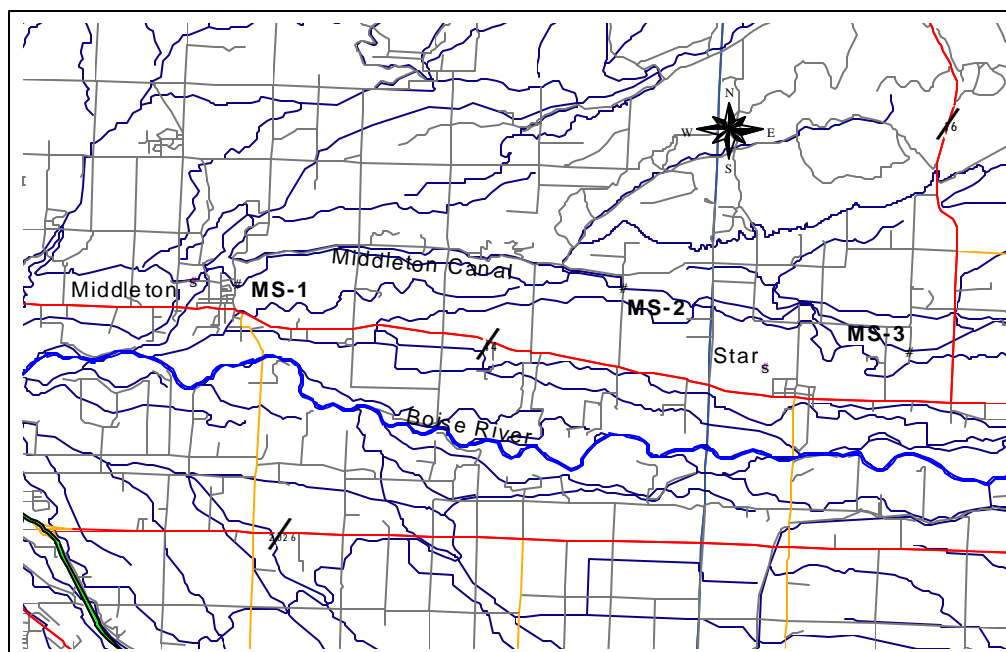


Figure 1. Mill Slough Sampling Sites (MS)

apart had concentrations of 66 mg/L and 62 mg/L for a mean concentration of 64mg/L (Figure 2). Although the upstream site had a minor exceedance in May the downstream station (MS-1) which discharges into the Lower Boise River had a mean concentration of only 22mg/L. The overall TSS average for the nine sampling events were MS-1 13mg/L, MS-2 23 mg/L, and MS-3 35 mg/L.

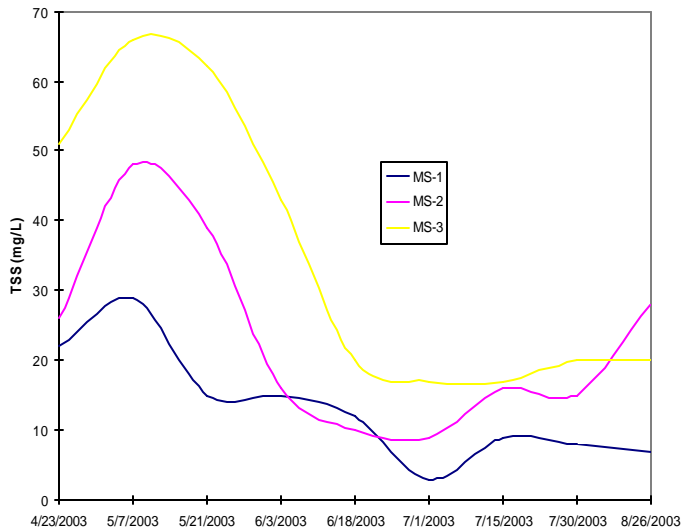


Figure 2. Mill Slough TSS concentrations.

Phosphorus

Mill Slough discharges directly into the Lower Boise River at the town of Middleton. According to the Snake River Hells Canyon Complex (SR-HC) TMDL the Boise River would need to reduce its total phosphorus (TP) load, to the Snake River, by approximately 78%. The TP concentration target within the Snake River is 0.07 mg/L. This is a total phosphorus target which includes both particulate phosphorus and dissolved phosphorus.

The mean concentration of TP for Mill Slough was consistent throughout the sampling period with MS-1 and MS-2 at .22 mg/L, and MS-3 at .21 mg/L. If nonpoint source inputs into the Boise River were required to meet the SR-HC TMDL concentration of 0.07 mg/L Mill Slough on average would require a 68% reduction in TP.

If the majority of TP within Mill Slough was of the particulate type (primarily bound to sediment and organic matter) reductions could be achieved through various sediment reduction Best Management Practices (BMPs). Unfortunately, the majority of the TP in the system consists in the dissolved form of phosphorus.

The percentage of dissolved phosphorus (as a percentage of TP) increases slightly from station MS-3 (86%) to station MS-1 (95%). The average dissolved phosphorus percentage for all of the stations was 91%. Figure 3 exhibits the relationship between total phosphorus and dissolved phosphorus.

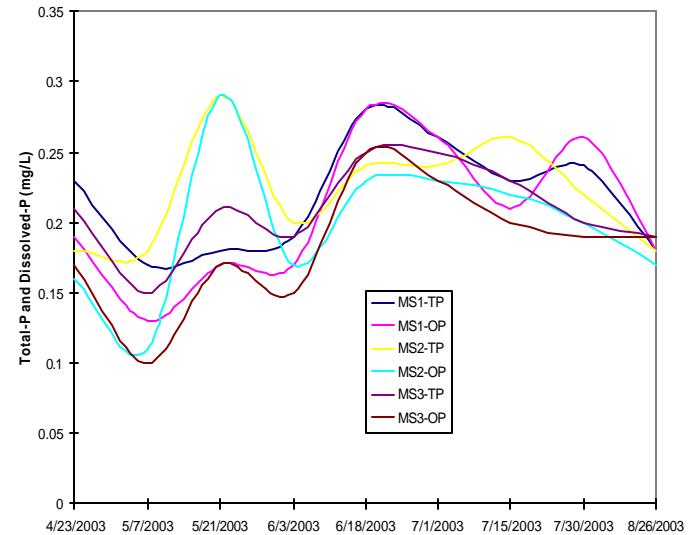


Figure 3. Mill Slough total-P and dissolved-P concentrations.

Discharge

There is no correlation between the discharge rate of Mill Slough and concentration loads of TSS or TP. There is great variability in the discharge rates found at the three sites. Water is constantly being diverted out of and back into Mill Slough during the irrigation season. MS-1 had the lowest average discharge rate (23.8 cfs) of all the stations (Figure 4).

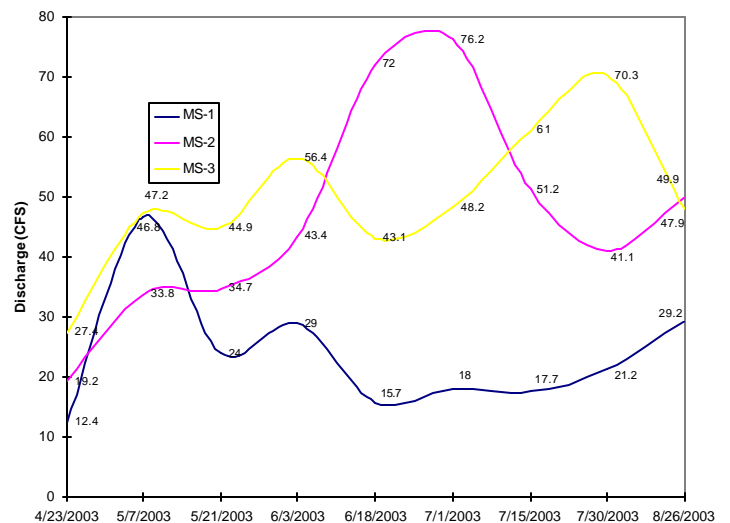


Figure 4. Mill Slough discharge rate.

Conclusions

The area around Mill Slough is a mixture of agricultural lands and new urban development (subdivisions and ranchettes). The primary agricultural activity is row crop agriculture using furrow irrigation techniques. Rosti Farms use a variety of BMP's which include polyacrylamide (PAM), straw mulch in furrows, and sediment ponds. It appears from the data that the bulk of BMP activities within the watershed have reduced sediment and particulate phosphorus runoff into Mill Slough. The data indicates that additional efforts to reduce the amount of sediment entering Mill Slough would have little effect on the overall water quality or dissolved phosphorus concentration.

The major pollutant within Mill Slough, that may affect the Lower Boise River is dissolved phosphorus. Dissolved phosphorus is the most bioavailable form of phosphorus, if critical levels are exceeded in surface water, it may cause excessive growth of algae and other nuisance aquatic vegetation.

Sources of excessive dissolved phosphorus are often hard to pinpoint and control. Research shows there is a direct relationship between the concentration of dissolved phosphorus in surface runoff and soil test phosphorus levels. There is a concern that high to excessively high phosphorus levels in the soil profile may be a primary contributor to pollution problems. Cropping practices affect the concentration and amount of bioavailable phosphorus in runoff that leaves agricultural fields. Erosion control practices reduce the amount of particulate phosphorus but generally increase the concentration of dissolved phosphorus in runoff.

The problem arises when adsorption sites for phosphorus in a soil become saturated, which make phosphorus potentially more available for runoff and leaching losses. Movement of dissolved phosphorus into surface water systems then becomes possible through shallow ground water or tile drainage systems.

Although there are inevitable losses of bioavailable phosphorus from agricultural soils, losses can be minimized by proven management practices. Some of those practices are as follows:

- Do not build or maintain excessive phosphorus within the soil profile.
- Do not apply more phosphorus than the amounts needed for crop production.
- Incorporate phosphorus additions.
- Use soil conservation techniques to keep erosion to a minimum.

- Avoid application of fertilizers on frozen or snow covered grounds to minimize runoff.
- Practice proper water management.
- Develop a nutrient management plan.

References

(IDEQ) Idaho Department of Environmental Quality. 2003. Snake River Hells Canyon TMDL.

(IDEQ) Idaho Department of Environmental Quality. 2001. Lower Boise River TMDL and Subbasin Assessment.